

Listing of Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Cancelled)
2. (Cancelled)
3. (Cancelled)
4. (Cancelled)
5. (Cancelled)
6. (Cancelled)
7. (Cancelled)
8. (Cancelled)
9. (Cancelled)
10. (Cancelled)
11. (Cancelled)

12. (Currently Amended) ~~The method according to claim 11,~~ A method for finding a next free bit in a register having N bits and a current pointer pointing to one of the bits, the method comprising:

breaking the N bits of a check vector in the register into M parts, wherein N and M are integers and $1 < M < N$; and

selecting an available part that has a free bit;

wherein the available part is a first part, having a free bit, to the left of the part pointed to by the current pointer; and

wherein the step for selecting the available part comprises:
breaking the current pointer into upper bits and lower bits, wherein the current pointer has X bits, the upper bits have Y bits and a value U, and the lower bits have X-Y bits and a value L, and wherein $0 \leq U \leq 2^Y - 1$, and $0 \leq L \leq 2^{X-Y} - 1$, where all of X, Y, U, and L are integers;
creating a check sector, wherein each bit of the check sector results from performing an AND operation to all bits of a corresponding part of the M parts;
obtaining an add vector by setting its bit number U;
adding the add vector to the check sector to obtain a sum; and
multiplying the sum with an inverse of the check sector.

13. (Cancelled)

14. (Currently Amended) ~~The method according to claim 13,~~ A method for finding a next free bit in a register having N bits and a current pointer pointing to one of the bits, the method comprising:

breaking the N bits of a check vector in the register into M parts, wherein N and M are integers and $1 < M < N$; and

selecting an available part that has a free bit;

wherein the available part is a first part, having a free bit, to the left of the part pointed to by the current pointer;

the method further comprising finding a free bit in the available part; and

wherein the step for finding an empty a free bit comprises:

increasing the available part by 1; and

multiplying the increased available part with an inverse of the available part.

15. (Cancelled)

16. (Cancelled)

17. (Cancelled)

18. (Cancelled)

19. (Currently Amended) ~~The method according to claim 7, further~~ A method for finding a next free bit in a register having N bits and a current pointer pointing to one of the bits, the method comprising:

breaking the N bits of a check vector in the register into M parts, wherein N and M are integers and $1 < M < N$;

selecting an available part that has a free bit;

creating a check sector, wherein each bit of the check sector results from performing an AND operation to all bits of a corresponding part of the M parts; and

deciding whether the register has a free bit by performing an AND operation to all bits of the check sector.

20. (Cancelled)

21. (Cancelled)

22. (Cancelled)

23. (Cancelled)

24. (Cancelled)

25. (Currently Amended) ~~The apparatus according to claim 24,~~ An apparatus for finding a next free bit in a register having N bits and a current pointer pointing to one of the bits, the apparatus comprising:

a first breaker for breaking the N bits of the check vector in the register into M parts, wherein N and M are integers and $1 < M < N$; and

a selector for selecting an available part that has a free bit, wherein the selector selects the available part on the left of the part pointed to by the current pointer;

a first breaker for breaking the N bits of the check vector in the register into M parts, wherein N and M are integers and $1 < M < N$; and

a check sector generator for generating a check sector, wherein each bit of the check sector results from performing an AND operation to all bits of a corresponding part of the M parts; and

a second breaker for breaking the current pointer into upper bits and lower bits, wherein the current pointer has X bits, the upper bits have Y bits and a value U, and the lower bits have X-Y bits and a value L, and wherein $0 \leq U \leq 2^Y - 1$, and $0 \leq L \leq 2^{X-Y} - 1$, where all of X, Y, U, and L are integers;

wherein the selector comprises:

an add vector generator, setting bit number U of the add vector;

an adder for adding the add vector to the check sector to obtain a sum; and

a multiplier for multiplying the sum with an inverse of the check sector.

26. (Cancelled)

27. (Cancelled)

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28. (Cancelled)

29. (Cancelled)

30. (Cancelled)

31. (Cancelled)

32. (Currently Amended) ~~The apparatus according to claim 31,~~ An apparatus for finding a next free bit in a register having N bits and a current pointer pointing to one of the bits, the apparatus comprising:

a first breaker for breaking the N bits of the check vector in the register into M parts, wherein N and M are integers and $1 < M < N$;

a selector for selecting an available part that has a free bit;

a second breaker for breaking the current pointer into upper bits and lower bits, wherein the current pointer has X bits, the upper bits have Y bits and a value U, and the lower bits have X-Y bits and a value L, and wherein $0 \leq U \leq 2^Y - 1$, and $0 \leq L \leq 2^{X-Y} - 1$, where all of X, Y, U, and L are integers; and

a free bit finder, wherein the free bit finder finds a free bit on the left of the bit pointed to by the current pointer;

~~wherein the empty free bit finder comprises:~~

an add vector generator, setting bit number L of the add vector;

an adder for adding the add vector to the available part to obtain a sum; and

a multiplier for multiplying the sum with an inverse of the available part.

33. (Cancelled).

34. (Currently Amended) ~~The apparatus according to claim 33,~~ An apparatus for finding a next free bit in a register having N bits and a current pointer pointing to one of the bits, the apparatus comprising:

a first breaker for breaking the N bits of the check vector in the register into M parts,
wherein N and M are integers and $1 < M < N$;

a selector for selecting an available part that has a free bit; and
a free bit finder, wherein the free bit finder finds a free bit from the beginning of the available part;

wherein the ~~empty~~ free bit finder comprises:
an adder for increasing the available part by 1; and
a multiplier for multiplying the increased available part with an inverse of the available part.

35. (Currently Amended) ~~The apparatus according to claim 20, further comprising:~~ An apparatus for finding a next free bit in a register having N bits and a current pointer pointing to one of the bits, the apparatus comprising:

a first breaker for breaking the N bits of the check vector in the register into M parts,
wherein N and M are integers and $1 < M < N$;

a selector for selecting an available part that has a free bit;
a check sector generator for generating a check sector, wherein each bit of the check sector results from performing an AND operation to all bits of a corresponding part of the M parts; and

a register status unit for performing an AND operation to all bits of the check sector.

36. (Currently Amended) The apparatus according to claim [[20]] 35, further comprising:

a next vector generator for generating the next vector with the found ~~empty~~ free bit masked.

37. (Cancelled)

38. (Cancelled)

39. (Currently Amended) The apparatus according to claim [[37]] 49, wherein the selecting means selects the available part on the left of the part pointed to by the current pointer.

40. (Currently Amended) The apparatus according to claim [[39]] 51, further comprising:

means for generating a check sector, wherein each bit of the check sector results from performing an AND operation to all bits of a corresponding part of the M parts.

41. (Cancelled)

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43. (Cancelled)

44. (Cancelled)

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46. (Cancelled)

47. (Cancelled)

48. (Cancelled)

49. (Currently Amended) ~~The apparatus according to claim 48,~~ An apparatus for finding a next free bit in a register having N bits and a current pointer pointing to one of the bits, the apparatus comprising:

means for breaking the N bits of the check vector in the register into M parts, wherein N and M are integers and $1 < M < N$; and

means for selecting an available part that has a free bit;

a second means for breaking the current pointer into upper bits and lower bits, wherein the current pointer has X bits, the upper bits have Y bits and a value U, and the lower bits have X-Y bits and a value L, and wherein $0 \leq U \leq 2^Y - 1$, and $0 \leq L \leq 2^{X-Y} - 1$, where all of X, Y, U, and L are integers; and

means for finding the free bit, wherein the free bit finding means finds the free bit on the left of the bit pointed to by the current pointer;

wherein the ~~empty~~ free bit finding means comprises:

means for generating an add vector, setting bit number L of the add vector;

means for adding the add vector to the available part to obtain a sum; and

means for multiplying the sum with an inverse of the available part.

50. (Cancelled)

51. (Currently Amended) ~~The apparatus according to claim 50,~~ An apparatus for finding a next free bit in a register having N bits and a current pointer pointing to one of the bits, the apparatus comprising:

means for breaking the N bits of the check vector in the register into M parts, wherein N

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and M are integers and $1 < M < N$; andmeans for selecting an available part that has a free bit; andmeans for finding the free bit, wherein the free bit finding means finds the free bit from the beginning of the available part;wherein the ~~empty~~ free bit finding means comprises:

means for increasing the available part by 1; and

means for multiplying the increased available part with an inverse of the available part.

52. (Currently Amended) ~~The apparatus according to claim 37, further~~ An apparatus for finding a next free bit in a register having N bits and a current pointer pointing to one of the bits, the apparatus comprising:

means for breaking the N bits of the check vector in the register into M parts, wherein N and M are integers and $1 < M < N$;

means for selecting an available part that has a free bit;

means for generating a check sector, wherein each bit of the check sector results from performing an AND operation to all bits of a corresponding part of the M parts; and

means for performing an AND operation to all bits of the check sector.

53. (Currently Amended) The apparatus according to claim ~~37~~ 52, further comprising:

means for generating the next vector with the found free bit masked.

54. (Cancelled)

55. (Cancelled)

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56. (Cancelled)

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